

## SUBJECT INDEX

- Accounting, office records, 617
- Algae, experiences, Davenport, Iowa, 622
- American Water Works Association,
  - annual convention, 807
  - council on Standardization, 632
  - finance committee's report, 793
  - publication committee's report, 627
  - secretary's report, 943
  - society affairs, 134, 362, 531, 658, 807, 947
  - treasurer's report, 798
- Bacterial index, standard, 502
- Baltimore, Md., mechanical equipment, 1
  - microorganisms, water supply, 712
  - solution of corrosion and coagulation problems at Montebello filters, 408
- Bile, inhibit or stimulate growth of colon group, 612
- Boutron Boudet soap solution, 892
- Cast iron pipe, centrifugal, 703
  - failures, 846
  - pressures higher than current specifications, 851
  - revision of standard specifications, 917
- Cement gun in water works practice, 446
- Centrifugally, cast iron pipe, 703
- Chlorination, control, Virginia, 783
  - phenolic compound with coal tar paint, 319
  - prior to filtration, 606
  - tastes and odors, 885, 899
  - tastes and odors from pipe coating, 455
- Cleveland, Ohio, tastes and odors, water supply, 463
  - water division construction progress, 226
  - water system, 418
- Coagulation and sedimentation with chemicals, 496
- Colloid chemistry, application to filtration, 247
  - relation to sewage treatment, 311
  - water purification, 350
- Colloidal chemistry and water purification, 130
- Colon group, effect of bile on growth, 612
- Committee reports, contract, standard form, 931
  - finance, 793
  - meter schedules, 636
  - publication, 627
  - revision of cast iron pipe specifications, 917
  - standardization, 632
- Condenser performance, St. Louis, Mo., 696
- Construction progress in Cleveland's water division, 226
- Contract, standard form, committee report, 931
- Coördination, water and fire departments' related activities, 595
- Council on Standardization, 632
- Culture media, bile for colon group, 612
  - reactions, 63, 125, 127
- Davenport, Iowa, algae experiences, 622
- Deferrization, physical chemistry, 491
- Detroit, Mich., mechanical aid for distribution work, 172
- Disease and drinking water, 46, 529
- Electrical operation of gate valves, 307
- Electrolysis, report of American Committee, 449
  - underground structures, causes and prevention, 274
- Erie, Pa., water works plant, 26
- Failures, cast iron pipe, 846
- Fifteen years investigations by the laboratories of the Metropolitan Water Board, London, Eng., 208
- Filters, (filtration), application of colloid chemistry to effluents, 247
  - application of hydrogen-ion concentration, 373
  - corrosion and coagulation problems at Montebello filters, Baltimore, 408

- Filters—*Continued.*  
 loading of filter plants, 157, 655  
 micro-organisms, Baltimore, Md., 712  
 operation of rapid sand filter plants, 603  
 Finance, committee report, 793  
 water works in United States, 685  
 Fire departments, activities related to water departments, 595  
 Fire pressure, 582  
 Fire prevention and fire protection in relation to public water supply, 731  
 Fire underwriters, requirements, 117  
 Good will of consumer, 398  
 Hetch Hetchy, water supply, San Francisco, Calif., 743  
 Hydrogen-ion, concentration, in practical filter plant operation, 373  
 indicators, 805  
 water supply problems, 39  
 Illinois, public water supplies, 857  
 waters in Wabash locomotive boilers, 906  
 Improved financial condition of water works in United States, 685  
 Interference of wells, 129  
 Investigation, condenser performance, St. Louis, Mo., 696  
 Iowa, spore-forming organisms, surface waters, 330  
 Joints, lead substitutes, 868  
 Victaulic, 921  
 Krug Park, Omaha, Neb., sanitation swimming pool, 284  
 Lake Erie, sanitary survey, opposite Cleveland, Ohio, 186  
 Lead substitutes, pipe joints, 868  
 Legislation, water supply, Ohio, 458  
 Loading of filter plants, 157, 655  
 Locomotive boilers, Illinois, waters, 906  
 Logarithmic paper for plotting meter tests, 241  
 Long record, microscopical examinations, 436  
 Los Angeles, Calif., metering, 426  
 Mains, electrolysis, 274  
 extensions, 358  
 tapping under pressure, 54, 129  
 under railroad tracks, 897  
 Measurement of water supply by Pitot tube, Syracuse, N. Y., 403  
 Mechanical aid for distribution work, Detroit, Mich., 172  
 Mechanical equipment for water works, municipally owned, 1, 172  
 Media, culture, reactions, 63, 125, 127  
 Memoir, Frederick, W. Cappelen, 348  
 Florence M. Griswold, 651  
 Meter schedules, report of committee, 636  
 Meters, Los Angeles, Calif., 426  
 testing before installation, 654  
 testing by single flow, 241  
 Metropolitan Water Board, London, Eng., fifteen years investigations by laboratories, 208  
 Microorganisms, Baltimore, Md., water supply, 712  
 Microscopical examinations, 436  
 New Jersey, water resources, 442  
 Niagara frontier, water supplies, 323  
 Observations concerning wood pipe, 549  
 Office records, accounting, 617  
 Ohio, water supply legislation, 458  
 Operation, rapid sand filter plants, 603  
 Operators, education and training in Texas, 300  
 Phenol, coal tar paint and chlorination, 319  
 Physical chemistry, deferrization, 491  
 Pipe, cast iron, failures, 846  
 cast iron, pressures higher than specifications, 851  
 cast iron, revision of standard specifications, 917  
 centrifugally cast iron, 703  
 steel, 839  
 under railroad tracks, 897  
 wood, 549, 802  
 Pipe foundry practice, departure, 703  
 Pitot tube, measurement water, Syracuse, N. Y., 403  
 Pressure, fire, 582  
 Pressure water filters, standard specifications, 928  
 Publication, committee report, 627  
 Reactions of culture media, 63, 125, 127  
 Reforestation, water sheds, 874  
 Relations of drinking water to disease, 46, 529  
 Removal of bacteria, by zeolitic water softeners, 474

- Requirements National Board Fire Underwriters, water works, 117
- San Francisco, Calif., Hetch Hetchy water supply, 743
- Sanitary survey of Lake Erie, 186
- Secretary, annual report, 946
- Service charge, judicial approval, 360
- Services, 51, 52
- Society affairs, 134, 362, 531, 658, 807, 947
- Solution of corrosion and coagulation problems at Montebello filters, Baltimore, Md., 408
- Specifications, pressure filters, standard, 928  
revision, cast iron pipe, 917
- Spore-forming organisms, Iowa surface waters, 330
- Standard bacterial index, 502
- Standard methods of water analysis, shortcomings from operator's viewpoint, 56, 132
- Standardization, bacterial index, 502  
council on, 632  
revision of specifications for cast iron pipe, 917  
short-comings in water analysis, 56, 132  
specifications, pressure filters, 928
- Steel mains, tapping under pressure, 54, 129
- Steel pipe, water works, 839
- St. Louis, Mo., condenser performance, water department, 696
- Stream pollution, problem, phases, 570
- Superintendent, water works, 589
- Syracuse, N. Y., measurement of water by Pitot tube, 403
- Tapping large steel mains under pressure, 54, 129
- Tastes and odors, chlorine and pipe coating, 455  
chlorine with coal tar paint, 319  
chlorination, 885, 899  
Cleveland, Ohio, water supply, 463  
removal, modern practice, 766
- Texas, education and training for water plant operators, 300
- Treasurer's report, 798
- Turbidimetry of water, 488
- Valves, gate, electrical operation, 307
- Victaulic, pipe joint, 921
- Virginia, chlorination control, 783
- Waste, water, 624
- Water purifications, algae, Davenport, Iowa, 622  
chlorination prior to filtration, 606  
chlorination, tastes and odors, 885, 899  
coagulation and sedimentation with chemicals, 496  
colloidal chemistry, 130, 350  
corrosion and coagulation problems at Baltimore, Md., solution, 408  
education and training operators in Texas, 300  
hydrogen-ion concentration and filter plant operation, 373  
obscure relations to disease, 46, 529  
operation of rapid sand filter plants, 603  
physical chemistry of deferrization, 491  
tastes and odors, 885, 899
- Water rates, industrial consumers, 392, 528  
municipal, 353, 357
- Water sanitation at Krug Park swimming pool, 284
- Watersheds, reforestation, 874
- Water softeners, zeolitic, bacterial removal, 474  
factor in municipal supply, 295
- Water supplies, algae at Davenport, Iowa, 622  
chlorination control, Virginia, 783  
chlorination, tastes and odors, 885, 899  
coagulation and sedimentation, with chemicals, 496  
deferrization, physical chemistry, 491  
disease, 46, 529  
hydrogen-ion concentration, 39  
Illinois, 857, 906  
legislation, Ohio, 458  
measurement, Pitot tube, Syracuse, N. Y., 403  
metering, Los Angeles, Calif., 426  
Metropolitan Water Board, London, Eng., 208  
microorganisms, Baltimore, Md., 712  
microscopical examinations, long record, 436  
New Jersey, resources, 442  
Niagara frontier, 323  
cross connections, by-passes and emergency intakes, 343  
services, 51, 52  
standard bacterial index, 502

- Water supplies—*Continued.*  
     standard methods, short-comings, 56, 132  
     tastes and odors, 885, 899  
     tastes and odors, chlorine and pipe coating, 455  
     tastes and odors, Cleveland, O., 463  
     taste and odor, removal, modern practice, 766  
     turbidimetry, 488  
     zeolitic water softeners, bacterial removal, 474  
 Watersupply, legislation in Ohio, 458  
 Water works, Baltimore, Md., mechanical equipment, 1  
     cast iron pipe, failures, 846  
     centrifugal cast iron pipe, 703  
     Cleveland, Ohio, water system, 418  
     condenser performance, St. Louis, Mo., 696  
     Detroit, Mich., mechanical equipment, 172  
     Erie, Pa., 26  
     fire pressure, 582  
     improved financial condition, 685  
     National Board Fire Underwriters requirements, 117  
     office records and accounting, 617  
     reforestation, watersheds, 874  
     San Francisco, Calif., Hetch Hetchy, 743  
     steel pipe, 839  
     superintendent, 589  
     water and fire departments' activities, 595  
     water waste, 624  
     wood pipe, observations, 549, 802  
 Wells, interference, 129  
 Wood pipe, 802  
     observations, 549  
 Zeolitic water softeners, bacterial removal, 474

## AUTHOR INDEX

- ACKERMAN, J. WALTER, services, 51
- AMSBARY, F. C., the good will of the consumer, 400  
office records and accounting, 618
- ANDREWS, ROBERT E., general requirements of the National Board of Fire Underwriters in regard to water works, 117
- BAKER, GERALD C., removal of bacteria by zeolitic water softeners, 474
- BANKSON, E. E., municipal water rates, 357  
water rates for industrial consumers, 392
- BARNHARD, P., office records and accounting, 620
- BARR, WM. M., water softening as a factor in municipal supply, 295
- BARTOW, EDWARD, the water works superintendent, presidential address, 589
- BAYLIS, JOHN R., bromthymol blue and phenol red color standards do not deteriorate very rapidly, 805  
micro-organisms in the Baltimore water supply, 712  
the solution of corrosion and coagulation problems at Montebello filters, Baltimore, 408
- BERNHAGEN, LEWIS O., the education and training of water plant operators in Texas, 300
- BIRDSALL, LEWIS I., short-comings in the present "Standard Methods of Water Analysis" from the operator's viewpoint, 56
- BUNKER, G. C., (with H. Schuber), the reactions of culture media, 63
- BUSWELL, A. M., Boutron Boudet soap solution, 892
- CARRICK, O. W., use of Illinois waters in Wabash locomotive boilers, 906
- CHESTER, J. N., (with J. S. Dunwoody), the Erie, Pa. water works plant, 26
- CLARKE, D. D., extension of water mains, 358
- COX, H. F., lead substitutes for pipe joints, 871
- CRANCH, E. T., lead substitutes for pipe joints, 868
- DAY, LEONARD A., report of an investigation of condenser performance in the St. Louis water department, 696
- DEAN, PETER PAYNE, electrical operation of gate valves, 307
- DITTOE, W. H., (with F. H. Waring), water supply legislation in Ohio, 458
- DIXON, G. G., lead substitutes for pipe joints, 871
- DONALDSON, WELLINGTON, chlorination tastes and odors, 885
- DUNWOODY, J. S., (with J. N. Chester), the Erie, Pa. water works plant, 26
- ELLIOTT, G. A., the use of steel pipe in water works, 839
- ELLMs, J. W., (with W. C. Lawrence), the causes of obnoxious tastes and odors sometimes occurring in Cleveland water supply, 463
- ELLMs, J. W., coagulation and sedimentation with chemicals, 496  
observations on the operation of rapid sand filter plants, 603  
a sanitary survey of Lake Erie, opposite Cleveland, Ohio, in 1920, 186
- ELY, H. M., tastes and odors, 899
- ENSLow, LINN H., (with A. Wagner), applied hydrogen ion concentration, 373
- ENSLow, LINN H., the reactions of culture media, 127  
water chlorination control in Virginia, 783
- FERGUSON, HARRY F., public water supplies in Illinois, 857  
tastes and odors, 902
- FLOWER, G. E., Cleveland water system, 418
- FOLWELL, A. PRESCOTT, services, 52

- GIBSON, J. E., lead substitutes for pipe joints, 869  
water mains under railroad tracks, 897
- GILLESPIE, PETER, a departure in pipe foundry practice, 703
- GOLDSMITH, CLARENCE, coordination of water and fire departments' related activities, 595
- GOODELL, J. M., judicial approval of service charge, 360
- GOURLEY, H. J. F., interference of wells, 129
- GREENFIELD, E. M., tastes and odors, 903
- GWINN, D. R., the good will of the consumer, 398  
office records and accounting, 618  
water mains under railroad tracks, 897
- HANNAN, FRANK, hydrogen ion concentration and water supply problems, 39
- HARRISON, W. H., the good will of the consumer, 401
- HAWLEY, W. C., lead substitutes for pipe joints, 868, 869, 870  
water mains under railroad tracks, 898
- HAZEN, ALLEN, water rates, 528
- HECHMER, C. A., the probable formation of phenolic compounds by a chlorinated water in contact with a coal tar paint, 319
- HENDERSON, C. R., fire pressure, 582  
experiences with algae at Davenport, Iowa, 622
- HINMAN, JACK J., Jr., (with Max Levine), a facultative spore-forming lactose-fermenting organism from Iowa surface waters, 330
- HOSKINS, J. K., some phases of the stream pollution problem, 570
- HOWARD, NORMAN J., chlorination prior to filtration, 606  
modern practice in the removal of taste and odor, 766
- HUGGANS, R. D., office records and accounting, 618
- INMAN, C. E., cast iron water pipe for pressures higher than allowed by current specifications, 851
- JENSEN, J. A., lead substitutes for pipe joints, 871
- JORDAN, FRANK C., fire prevention and fire protection in relation to the public water supply, 731
- LAUTZ, W. E., office records and accounting, 617
- LAWRENCE, W. C., (with J. W. Ellms), the causes of obnoxious tastes and odors sometimes occurring in the Cleveland, Ohio, water supply, 463
- LEDoux, J. W., some observations concerning wood pipe, 549
- LEVINE, MAX, (with Jack J. Hinman, Jr.), a facultative spore-forming lactose-fermenting organism from Iowa surface waters, 330
- LEVINE, MAX, does bile inhibit or stimulate growth of the colon group, 612
- LUSCOMBE, W., lead substitutes for pipe joints, 868  
water mains under railroad tracks, 897
- MACDONALD, E., office records and accounting, 620
- MCINNESS, F. A., causes of failure in cast iron pipe, 846
- MCLAUGHLIN, A. J., drinking water and disease, 529
- MASON, W. P., the reactions of culture media, 128
- METCALF, LEONARD, the improved financial condition of water works in the United States, 685
- MILLER, W. E., municipal water rates, 353
- MITCHELL, W. MONTGOMERY, mechanical aids for distribution work in Detroit, Mich., 172
- MOHLMAN, F. W., (with Langdon Pearse), colloid chemistry and its relation to tank treatment of sewage, 311
- MOLIS, WM., office records and accounting, 621  
tastes and odors, 904, 905
- MONFORT, W. F., the reactions of culture media, 128
- NELSON, FRED B., determining by a single flow test the capacity of a meter at all pressure losses, 241
- O'BRIEN, D. F., tapping large steel mains under pressure, 54



- O'SHAUGNESSY, M. M., the Hetch Hetchy water supply of the City of San Francisco, 743
- PAYROW, H. G., wood pipe and water hammer, 802
- PEARSE, LANGDON, (with F. W. Mohlman), colloid chemistry and its relation to tank treatment of sewage, 311
- PERKINS, R. N., water sanitation at Krug Park swimming pool, Omaha, Neb., 284
- PHILLIPS, VICTOR B., report of the American Committee on Electrolysis, a review, 449
- PINCUS, SOL, cross connections, bypasses and emergency intakes on public water supplies, 343
- PIRNIE, MALCOLM, application of colloid chemistry to study of filter effluents, 247
- RACE, JOSEPH, colloid chemistry and water purification, 130
- READ, GEORGE, metering of Los Angeles, 426
- ROBERTSON, H. E., certain obscure relations of drinking water to disease, 46
- ROWE, E. J., chlorine tastes and odors from pipe coating, 455
- RUGGLES, A. V., construction progress in the Cleveland division of water, 226
- SAVILLE, THORNDIKE, the Victaulic pipe joint, 921
- SCHUBER, H., (with G. C. Bunker), the reactions of culture media, 63
- SIEMS, BERNARD V., ownership and operation of trench excavators, 1
- SKINNER, A. E., water waste, 624
- SNOWDEN, R. C., the water supply of the Niagara frontier, 323
- SPELLER, F. N., tapping large steel mains, 129
- STARBIRD, H. R., measurement of water supply by the Pitot tube in Syracuse, N. Y., 403
- STEIN, MILTON F., colloid chemistry and water purification, 350  
the loading of filter plants, 655
- STEWART, E. B., causes and prevention of electrolysis troubles in underground pipe structures, 274
- STREETER, H. W., the loading of filter plants, 157
- TALBOT, L. R., the cement gun in water works practice, 446
- TAYLOR, GEORGE R., problems in the reforestation of watersheds, 874
- TAYLOR, S. H., lead substitutes for pipe joints, 872
- WAGNER, A., (with Linn H. Enslow), applied hydrogen ion concentration, 373
- WAGNER, RICHARD F., the value of meter testing before installation, 654
- WARING, F. H., (with W. H. Dittoe), water supply legislation in Ohio, 458
- WELLS, P. V., (with W. F. Wells), a standard bacterial index, 502
- WELLS, P. V., turbidimetry of water, 488
- WELLS, W. F., (with P. V. Wells), a standard bacterial index, 502
- WESTON, ROBERT SPURR, the physical chemistry of deferrization, 491
- WHIPPLE, M. C., fifteen years of investigations by the laboratories of the Metropolitan Water Board, 208  
the reactions of culture media, 125
- WHIPPLE, G. C., a long record of microscopical examinations, 436
- WILCOX, W. F., lead substitutes for pipe joints, 870
- WOLMAN, ABEL, editorial review, water resources of the State of New Jersey, 442

## INDEX TO ABSTRACTS

### I. AUTHORS

- ABBOTT, WALTER F., *see* Carter, C. E., and Abbott, W. F.  
 ACREE, S. F., *see* Mellons, R. R., et al.  
 ADAMS, O. P., *see* Adams, O. P., and Hoots, P. F.  
 ADAMS, O. P., AND HOOTS, P. F., 672  
 American Gas Association, 543  
 American Medical Association—Journal, 665  
 American Railway Engineering Association, 825, 828  
 American Society for Testing Materials, 537  
 ANDERSON, V. G., *see* Avery, D. et al.  
 ANDREWS, GEO. C., 371, 951  
 ARMSTRONG, C. A., 820-1  
 ARMSTRONG, JAMES W., 371, 958  
 ARTHUR, R. C., *see* Arthur, R. C. and Keeler, E. A.  
 ARTHUR, R. C., AND KEELER, E. A., 835  
 AVERY, D., *see* AVERY, D., et al.  
 AVERY, D., HEMINGWAY, A. J., ANDERSON, V. G., AND READ, T. A., 823  
 AVERY, P. M., *see* Mellons, R. R., et al.  
 AZBE, V. J., 678  
 BABBITT, H. E., 539  
 BAKER, C. M., 818  
 BARDWELL, R. C., 827  
 BARR, W. M., 827  
 BARTLETT, D. K., 154  
 BATES, CARLOS G., *see* Bates, Carlos G. and Henry, Alf. J.  
 BATES, CARLOS G. AND HENRY, ALF. J., 661  
 BAXTER, GEO., 821  
 BAYLIS, J. R., 675  
 BEBB, E. C., 833  
 BECKER, H. G., 538  
 BENNETT, C. WILFRED, *see* Storr, F. and Bennett, C. W.  
 BERBERICK, N. M., *see* Berberick, N. M. and Hardenbergh, W. A.  
 BERBERICK, N. M., AND HARDENBERGH, W. A., 818  
 BERGER, 666  
 BERNHAGEN, LEWIS O., 143  
 BIGGS, GEO. W., JR., 954  
 BIRDSALL, LEWIS I., 817  
 BITTING, A. W., 956  
 BLOOD, W. H., JR., 818  
 BOHLING, W. H., 663  
 Boston District Joint Board, 667  
     *see also* Goodnough, X. H.  
 BOWEN, D. C., 366  
 BRENSKY, A. A., *see* Buswell, A. M., Brensky, A. A., and Neave, S. L.  
 BREWSTER, J. F., *see* Brewster, J. F., and Raines, W. G., Jr.  
 BREWSTER, J. F., AND RAINES, W. G., JR., 547  
 BROGGINI, JOHN M., 829  
 BROWN, E. H., *see* Quayle, L. A., and Brown, E. H.  
 BROWN, J. H., 669  
 BROWNE, F. L., *see* Browne, F. L., and Mathews, J. H.  
 BROWNE, F. L., AND MATHEWS, J. H., 676  
 BRUHNS, G., 956  
 BRUSH, WM. W., 662, 666, 823  
 BUCHWALD, E., 677  
 Bulletin d'Hygiène Balnéaire et de Propreté, 831  
 BUNKER, GEO. C., 150  
 BURCHARD, E. D., 368  
 BURGESS, GEO. K., 369  
 BURGESS, J. H., 833  
 BUSWELL, A. M., *see* BUSWELL, A. M., Brensky, A. A., and Neave, S. L.  
     *see* Buswell, A. M., and Edwards, G. P.  
     *see* Greenfield, R. E., and Buswell, A. M.  
 BUSWELL, A. M., BRENSKY, A. A., AND NEAVE, S. L., 671  
 BUSWELL, A. M., AND EDWARDS, G. P., 667  
 California State Board of Health, 147  
 Canada Reclamation Service, 366  
 Canadian Engineer, 683  
 CAPEN, CHARLES H., JR., 370



- CARLIN, PHIL., 819  
 CARPENTIER, G., *see* Thomas, P. and Carpentier, G.  
 CARTER, CLARENCE E., *see* Carter, Clarence E. and Abbott, Walter F.  
 CARTER, CLARENCE E., AND ABBOTT, WALTER F., 366  
 CASALE, LUIGI, 680  
 CASTE, P., *see* Meunier, L., and Caste, P.  
 CAVEL, L., 822  
 Chemical and Metallurgical Engineering, 544  
 CHESTER, J. N., 825  
 CHORLEY, R. W., 827  
 CLARK, WM. G., 951  
 COBLEIGH, W. N., *see* Montana State Board of Health  
 COHEN, BARNETT, 669  
 COLEMAN, G. H., *see* Coleman, G. H., with Noyes, W. A.  
 COLEMAN, G. H., with Noyes, W. A., 832  
 Colorado State Board of Health, 366  
 Columbus, Ohio, City Bulletin, 671  
 CONARD, WM. R., 151  
 CONRAD, WM. R., 370  
 Contract Record, 154  
 COOPER, E. A., 547  
 Copenhagen Waterworks, 678  
 COPPETTI, V., 678  
 COULTER, WALDO S., 547, 674  
 COYE, J. S., 538  
 CRAWFORD, H. L., 674  
 CRISP, M. H. T., 835  
 CROFT, TERRELL, 672  
 CROSS, R. J., *see* Cross, R. J., and Irvin, Roy  
 CROSS, R. J., AND IRVIN, ROY, 671  
 DANIELS, F. E., 675  
 Detroit Water Board, 674  
 DITTOE, W. H., 367, 535  
 DODWELL, C. E. W., 678  
 DOMINICIS, A. DE, 680  
 DON, JOHN, 665  
 DONALDSON, WELLINGTON, 822-3  
 DUNBAR, W. P., 664  
 ECKEL, E. C., 833  
 EDDY, H. P., 142, 368, 370  
 EDWARDS, G. P., *see* Buswell, A. M., and Edwards, G. P.  
 ELLIS, D., 680  
 ELLMS, J. W., 829  
 EMERSON, C. A., JR., 541  
 EMSLANDER, R., *see* Gutbier, A., and Emslander, R.  
 ENGELMAN, M., 836  
 Engineering, 538  
 Engineering and Contracting, 152, 153, 154, 368, 369  
 Engineering News-Record, 142, 144, 370, 662, 663, 666, 824, 825, 829, 830, 951  
 ENSLOW, LINN H., *see* Messer, R., Wagner, A., and Enslow, L. H.  
*see* Wolman, A., and Enslow, L. H.  
 FAIR, GORDON M., 151  
 FERGUSON, HARRY F., 826  
 FERGUSON, S. P., 668  
 FERNANDEZ, O., *see* Fernandez, O., and Garmendia, T.  
 FERNANDEZ, O., AND GARMENDIA, T., 822  
 Fire and Water Engineering, 547, 548, 667  
 FLORENTINE, D., 679  
 FLU, P. C., 821, 831  
 FRANCKEN, T. G. J., 819  
 FRENCH, D. K., 827  
 FREUNDLICH, H., *see* Freundlich, H., and Loening, E.  
 FREUNDLICH, H., AND LOENING, E., 677  
 FULLER, GEO. W., 534  
 GARMENDIA, T., *see* Fernandez, O., and Garmendia, T.  
 GAZIN, L. M., 824  
 GILLESPIE, P., 544  
 GOODNOUGH, X. H., 152, 674  
*see also* Boston District Joint Board  
 GRASSER, G., 834  
 GRAY, HENRY L., 536  
 GREELEY, SAMUEL A., 542  
*see* Greeley, S. A., and Jordan, H. E.  
 GREELEY, S. A., AND JORDAN, H. E., 825  
 GREEN, W. H., 827  
 GREENBURG, LEONARD, 837  
 GREENFIELD, R. E., *see* Greenfield, R. E., and Buswell, A. M.  
 GREENFIELD, R. E., AND BUSWELL, A. M., 957  
 GUENTHER-SCHULZE, 545  
 GUTBIER, A., *see* Gutbier, A., and Emslander, R.  
*see* Gutbier, A., and Flury, F.  
 GUTBIER, A., AND EMSLANDER, R., 676  
 GUTBIER, A., AND FLURY, F., 831  
 GWINN, D. R., 823-4  
 HAHN, F. V. v., 677  
 HAMMICK, H. A., 957

- HANNAN, F., *see* Wolman, A., and Hannan, F.  
 HANNUM, E. R., 952  
 HARDENBERGH, W. A., *see* Berberick, N. M., and Hardenbergh, W. A.  
 Hartford (Conn.) Water Board, 674  
 HAWLEY, W. G., 154  
 HAZEN, ALLEN, 366, 370, 540, 830  
 HEFFERNAN, DAVID A., 150  
 HELBIG, A. B., 677  
 HELDERMAN, W. D., *see* Helderman, W. D., and Khainovsky, V.  
 HELDERMAN, W. D., and KHAINOVSKY, V., 547  
 HEMINGWAY, A. J., *see* Avery, D. et al.  
 HENRY, ALF. J., *see* Bates, Carlos G., and Henry, Alf. J.  
 HENRY, S. T., 662  
 HEUBLEIN, W. O., 546  
 HEYM, W., 546  
 HEYMAN, J. A., 830  
 HIGHLAND, Scotland G., 824  
 HILL, NICHOLAS S., JR., 148, 958  
 HINMAN, JACK, JR., 368  
 HOBBS, W. H., 827  
 HOLMQUIST, C. A., 541  
 HOCKADAY, J. W., 823  
 HOLWAY, A. S., 824  
 HOOTS, P. F., *see* Adams, O. P., and Hoots, P. F.  
 HORTON, ROBERT E., *see* Rainfall and Run-off Measurements Committee  
 HOUSTON, SIR ALEXANDER, 370  
 HOWARD, CHAS. B., *see* New Hampshire State Board of Health  
 HOWARD, NORMAN J., 682, 837  
 HUGHES, J. E., 143
- Illinois State Department of Public Health, 144, 147  
 Illinois State Water Survey, 534  
 Indiana State Board of Health, 825  
 INGHAM, E., 546  
 Iowa State Board of Health, 533  
 N.B. Read "Ohio" instead "Iowa"; for correction *see* 683  
 IRVIN, ROY, *see* Cross, R. J. and Irvin, Roy
- JACKSON, LLOYD E., 544  
 JOHNSON, GEORGE A., 818, 824, 826  
 JOHNSON, ROBT. F., 824  
 JONES, F. B., 681  
 JORDAN, H. E., *see* Greeley, S. A. and Jordan, H. E.  
 JUNE, R., 832
- KEELER, EARL A., 670  
*see* Arthur, R. C., and Keeler, E. A.  
 KELSEY, JOHN W., 145  
 KENNICOTT, CASS, 828  
 KHAINOVSKY, V., *see* Helderman, W. D., and Khainovsky, V.  
 KILLAM, SAMUEL E., 367  
 KISZKALT, KARL, 951, 952  
 KLAUBER, L. M., 545  
 KLEIN, P., 677  
*see* Traube, I., and Klein, P.  
 KNOWLES, C. R., 826  
 KOLTHOFF, I. M., 538  
 KOYL, C. H., 827  
 KRAUS, E. J., 676  
 KUEHL, HUGO, 835  
 KUNIGH, W. A., 674
- LANGMUIR, IRVING, 545  
 LARNER, HERBERT B., 664  
 LA RUE, E. C., 950  
 LAWRENCE, WM. H., 823  
 LEBEAU, *see* Lebeau and Picon  
 LEBEAU AND PICON, 956  
 LEDOUX, J. W., 367, 369, 952  
 LEVINE, MAX, 836  
 LEVY, L., 832  
 LOCKHARDT, W. F., 673, 834  
 LOENING, E., *see* Freundlich, H., and Loening, E.  
 LOMBARD, L., 665  
 Los Angeles Public Service Board, 675  
 LUNDQUIST, R. A., 144
- MABEE, W. C., 818, 829  
 MADELEY, JAMES, 153  
 MANHEIMER, W. A., 678  
 MALPHETTES, L., 832  
 MARSH, CLARENCE W., 370  
 Maryland State Department of Health, 533  
 MATHEWS, A. P., 538  
 MATHEWS, J. H., *see* Browne, F. L., and Mathews, J. H.  
 MATHES, GERARD H., 950  
 MCCAULEY, W. B., 953  
 McDowell, R. J. S., 679  
 MCKIBBEN, F. P., 956  
 MEADER, F. M., 675  
 MELLONS, R. R., *see* Mellons, R. R., et al.  
 MELLONS, R. R., ACREE, S. F., AVERY, P. M., and SLAGLE, E. A., 957  
 MENNES, A., 673  
 MESSER, RICHARD, *see* Messer, R., Wagner, A., and Enslow, L. H.  
 MESSER, R., WAGNER, A., and ENSLOW, L. H., 829

- MEUNIER, L., *see* Meunier, L., and Caste, P.  
 MEUNIER, L., AND CASTE, P., 832  
 MICHAELIS, L., 537, 545  
*see* Michaelis, L., and Timenez-Diaz, C.  
 MICHAELIS, L., AND TIMENEZ-DIAZ, C., 538  
 Minnesota State Board of Health, 534  
 Mississippi State Board of Health, 142  
 MITCHEL, GEO., 152  
 MITCHELL, L., 681  
 MONIER-WILLIAMS, G. W., 957  
 Montana State Board of Health, 143  
 MONIER, J., 664  
 MORRIS, FRED R., 548  
 MORRISSETTE, ROMEO, 817  
 MORSE, ROBT. B., 533  
*see* Morse, R. B., and Wolman, A.  
 MORSE, R. B., AND WOLMAN, A., 533  
 Municipal and County Engineering, 817  
 Municipal Engineers' Journal, 537  
 MUNSON, C. LA RUE, *see* Munson, C. La Rue, and Munson, Edgar  
 MUNSON, C. LA RUE AND MUNSON, EDGAR, 953  
 MUNSON, EDGAR, *see* Munson, C. La Rue, and Munson, Edgar  
 NAGY, B., 681  
 Nautical Gazette, 144  
 NEAVE, S. L., *see* Buswell, A. M., Brensky, A. A., and Neave, S. L.  
 NEUBER, 830  
 New England Water Works Association, 152, 368  
 New Hampshire State Board of Health, 143  
 New Jersey State Department of Health, 147, 534  
 New York State Department of Health, 826  
 Newton, C. Francis, 664  
 NICOLAU, JOSÉ, 830  
 NIEVELT, B. F. VAN, 673, 820  
 NOYES, W. A., *see* Coleman, G. H., with Noyes, W. A.  
 Ohio State Department of Health, 825  
 N.B. For "Ohio," read "Iowa," p. 533 as per correction, p. 683  
 O'SHAUGHNESSY, M. M., 542  
 OWENS, J. S., 537  
 PAREAU, A. H., 546  
 PARKER, THEODORE B., 369  
 PAUL, C. H., 673  
 PAUL, WO., 831  
 PEARSE, LANGDON, 676  
 PERMIEN, 835  
 PESCH, B. K., 957  
 PICON, *see* Lebeau and Picon  
 PIERSON, E. E., 819  
 POPP, GEORGE R., JR., 819  
 POTTER, ALEXANDER, 817  
 POWELL, S. T., *see* Wolman, A., and Powell, S. T.  
 POWER, 672, 820, 834  
 POWNALL, W. A., 827  
 PRYER, R. W., *see* Walker, W. F., 7 Pryer, R. W.  
 Public Works, 144, 675, 818, 819  
 QUAYLE, L. A., *see* QUAYLE, L. A. and Brown, E. H.  
 QUAYLE, L. A., and Brown, E. H., 543  
 Railway Age, 829  
 RAINES, W. G., JR., *see* Brewster, J. F., and Raines, W. G., Jr.  
 Rainfall and Run-off Measurements Committee, 151  
 RATLIFF, W. C., *see* Selvid, W. A., and Ratliff, W. C.  
 READ, T. A., *see* Avery, D., et al.  
 Rhode Island State Board of Health, 147  
 RICHARDS, E. HANNAFORD, *see* Richards, E. H., and Sawyer, G. C.  
 RICHARDS, E. H., AND SAWYER, G. C., 671  
 ROME, E. A., 371  
 RUSSELL, S. R., 536  
 SALE, J. W., 678  
 SARRAZIN, J., 545  
 SAUNDERS, J. T., 955  
 SAVILE, L. H., 680  
 SAWYER, G. C., *see* Richards, E. H., and Sawyer, G. C.  
 SCHENK, CHESTER, 672  
 SELVID, W. A., *see* Selvid, W. A., and Ratliff, W. C.  
 SELVID, W. A., AND RATLIFF, W. C., 670  
 SENIOR, SAMUEL P., 366  
 SHEPPERD, FRED, 824  
 SHEPPERD, MORRIS R., 826  
 SHERMAN, W. J., 817  
 SIEMS, V. BERNARD, 958  
 SIMMERSBACH, BRUNO, 955  
 SLAGLE, E. A., *see* Mellons, R. R., et al.  
 SMIT, JAN, 821  
 SMITH, GORDON Z., 367

- SMITH, A. H., Co., 667  
 SNEIDER, J. R., 148  
 SPELLER, FRANK N., 670  
 SPERR, F. W., JR., 547  
 SPERRY, D. R., 545  
 STEPHEN, F. W., 673  
 STOOF, H., 835  
 STORR, FREDERICK, *see* Storr, F., and Bennett, C. W.  
 STORR, F., AND BENNETT, C. W., 830, 955  
 STRADLING, R. E., 680  
 SUTTON, LINCOLNE, 673  
 SWETZ, A., 547
- TAPLAY, J. G., 681  
 TAYLOR, GEO. R., 952  
 TERRE HAUTE WATER WORKS Co., 536  
 THOMAS, P., *see* Thomas, P., and Carpentier, G.  
 THOMAS, P., AND CARPENTIER, G., 676  
 THOMPSON, J. WILBUR, 149  
 THUM, 544  
 TIGER, H. L., 956  
 TIMENEZ-DIAZ, C., *see* Michaelis, I., and Timenez-Diaz, C.  
 TRAUBE, I., *see* Traube, I., and Klein, P.  
 TRAUBE, I., AND KLEIN, P., 676
- United States Bureau of Census, 537  
 United States Bureau of Mines, 834  
 United States Reclamation Record, 675
- WAGNER, A., *see* Messer, R., Wagner, A., and Enslow, L. H.
- WALKER, W. F., *see* Walker, W. F., and Pryer, R. W.  
 WALKER, W. F., AND PRYER, R. W., 146  
 WALL, EDWARD E., 666, 825  
 WARING, F. H., 371  
 WARREN, W. D. P., 145  
 Water and Water Engineering, 663, 835, 954  
 WEBSTER, W. G., 834  
 WELLS, P. V., 831  
 WELLS, R. C., 679  
 WENTWORTH-SHIELDS, F. E., 680  
 WEST, C. J., 832  
 WEST, PERRY, 821  
 West Virginia State Board of Health, 142  
 WESTON, R. S., 541  
 WHIPPLE GEO. C., 150, 370, 539  
 WILLCOMB, G. E., 951  
 WILSON, J. A., 832  
 WILSON, L. F., 826, 827  
 WINKELMANN, H., 678  
 WINSLOW, C. E. A., 541  
 WINSTANLEY, A., 820  
 Wisconsin Engineer, 536  
 WOLFE, THOS. P., 368  
 WOLMAN, A., 533  
   *see* Morse, R. B., and Wolman, A.  
   *see* Wolman, A., and Enslow, L. H.  
   *see* Wolman, A., and Hannan, F.  
   *see* Wolman, A., and Powell, S. T.  
 WOLMAN, A., AND ENSLOW, L. H., 533  
 WOLMAN, A., AND HANNAN, F., 146, 533  
 WOLMAN, A., AND POWELL, S. T., 533  
 WORKER, J. G., 820
- ZAMKOW, L., 546

## INDEX TO ABSTRACTS

### II. SUBJECTS

- Acid Resisting Coating; for Concrete, 666
- Acidimetry; carbonate-free alkali for, 538
- Acidity; reserve, explanation of, 669
- Activated Sludge; alkalinity, ammonia, sulfide, disappear, 822  
fertiliser value of, 671  
nitrogen in; nature, availability, 671  
nitrogen cycle in, with limited air supply, 671  
nitrogen fixation not observed in, 671  
protein synthesis in, 671  
protozoa—bacteria relations in, 671  
separative systems; applicable to, 822  
volume—weight relations irregular, 671
- Adsorption; chemical, rather than physical; the time-lag between condensation and re-evaporation, 545  
toxicity and, 676  
*see* Colloid
- Air-Lift; *see* Pumps
- Albany, N. Y., *see* Water Supply
- Alkali, volumetric; carbonate-free, preparation of, 538
- Alkalinity; reserve, explanation of, 669  
*see* Water, Alkalinity
- Alpena, Mich., *see* Water Filtration, Rapid Sand
- Alumina; electrical charges on hydrosols of, 831  
hydrogen-ion concentration and precipitation and resolution of, 957  
*see* Water, Coagulation
- Aluminum; determination of, volumetric, 676
- Aluminum Sulfate; specifications for, 828  
*see* Water, Coagulation
- American Society for Municipal Improvements; president's 1921 address, 958
- American Society for Testing Materials; 1921 report, 537
- Appleton, Wis.; adopts zoning for water rates, 548
- Aqueduct; concrete, corrosion of by alkaline water, 154  
concrete, reinforced, 8-foot, Winnipeg, underdrainage of, 154  
masonry, ancient, Rio de Janeiro, 662  
*see* Conduit
- Arsenic; presence of, in spring, 147
- Austria; *see* Water Supply
- Bacillus welchii; Montclair, N. J., epidemic and, 664  
pathogenicity of, unproven, 370, 665  
significance and occurrence of, 534  
spore production of, not fully established, 370
- Bacteria; gas producing, spore forming, of high resistance, 368, 836  
mortality of, laws of, 669
- Bacteriological Media; titration, hydrogen-ion concentration, 669  
buffer index; reserve acidity and alkalinity, 669
- Bacterium aerogenes; significance of, 836  
differentiation of, desirable, 836
- Bacterium coli; acetaldehyde production by, 822  
alkalinity claimed to destroy, 821  
characteristics and subdivisions of group, 836  
detection and differentiation of group, 836  
Endo's medium and; mechanism of reaction, 822  
hydrogen-ion concentration and; sensitive to slight changes in, 669  
viability, and zone of tolerance, 669  
inhibition of; media for, 957

- mortality of, laws of, 669  
 pollution; best index of, 370, 836  
 temperature and viability of, 669  
 tests for; gas ratio, methyl red,  
 Voges-Proskauer, uric acid, 836  
**Bacterium paratyphosum**; culture  
 media and, 957  
**Bacterium typhosum**; alkalinity  
 claimed to destroy, 821  
**B. coli** and; typhosum less resist-  
 ant, 669  
 hydrogen-ion concentration and;  
 sensitive to slight changes in, 669  
 viability, and zone of toler-  
 ance, 669  
 inhibition of; and media for, 957  
 septic tanks and; method used to  
 recover, 831  
   not recovered unless seeded  
   artificially, 831  
   survival in, not over 3 days, 831  
 storage claimed to destroy, 821, 831  
 temperature and viability of, 669  
 Baltimore, *see* Water Supply  
**Barium**; *see* Boiler Feed Water  
**Bath, Me.**; standpipe repair at, 366  
**Battery, Storage**; *see* Storage Bat-  
 tery  
**Bielefeld, Germany**; *see* Water  
 Supply  
**Birmingham, Ala.**; *see* Water Supply  
**Boiler**; *see* Combustion  
   returns to, of condensate, 834  
**Boiler Compound**; anti-foam and  
 anti-scale distinguished, 827  
   opinions in favor of quoted, 827  
   Union Pacific R. R. experience  
   with, 827  
**Boiler Corrosion**; Com. Report,  
 Amer. Ry. Eng. Association, 828  
   mechanism of, chiefly electrolytic,  
   828  
   *see* Boiler Feed Water; Corrosion;  
   Water, Aggressive  
**Boiler Efficiency**; requirements for  
 90 per cent, 678  
**Boiler Feed Water**; carbonic acid  
 corrosion; control of, 956  
   careful check of quality advisable,  
   827  
   control of by conductivity tests,  
   820  
   de-aeration of, 670  
   distillation and evaporation plants,  
   832  
   grease most objectionable and  
   dangerous, 546  
   grease removal, 546  
   Griscom-Russell installation for,  
   832  
   hardness not the only criterion, 820  
   hydrogen-ion concentration of;  
   automatic record and control of,  
   670, 834  
   nitrates promote, 956  
   treatment; barium, 820  
     chemicals for, specifications,  
     828  
     exterior; economical limit for,  
     827  
     interior; 826, 827  
   *see* Boiler Compound  
   saving realised by; *see* Mo. Pac.  
   R. R.  
   soda ash; opinions favoring, 827  
   six favorable results from, on  
   Wabash R. R., 827  
   zeolitic; Borromite and Per-  
   mutite, 832  
   *see* Borromite, Permutite, Water  
   Softening, Water Supply, Rail-  
   road, and  
**Boiler Foaming**; suspended matter  
 and sludge, the causes, 827  
   water with sodium salt concentra-  
   tion 1000 grains per gallon suc-  
   cessfully used, 827  
**Boiler Life**; 33 years at Cleveland,  
 Ohio, 543  
**Boiler Scale**; fuel loss by, 681  
   prevention of, electrolytic, 545  
   removal of, with carbon dioxide,  
   671  
   *see* Boiler Compound  
**Borax Lake**; composition of water of,  
 679  
   hydrogen-ion concentration of, 679  
**Borate Equilibria and hydrogen-ion**  
**concentration**, 679  
**Borromite**; zeolitic; rapid; gives zero  
 hardness, 832  
**Boston, Mass.**; *see* Water Supply  
**Bridgeport**; *see* Water Supply  
**Bromine**; *see* Water, Bromine  
**Bryan, Ohio**; *see* Water Supply  
**Buffalo, N. Y.**; *see* Water Supply  
**Buffer**; bacteriological media and;  
 "buffer index", 669  
   glycerophosphates suitable, 957  
   reserve acidity and alkalinity and,  
   669  
**Calcium Carbonate**; hydrogen-ion  
 concentration and precipitation  
 of, 957  
**Calculus**; prevalence of, in Norfolk,  
 England, 673  
   questionably attributed to water  
   hardness, 673



- California; arsenic present in mineral spring, 147  
 State Board of Health Bulletin, 147  
 swimming pool regulations, 831  
 Cambridge, Mass.; *see* Water Supply; Filter Plants, New  
 Canada, Reclamation Service Report, 366  
 Canton; adopts water rate zoning, 547  
 Cap de la Madeleine, Que.; *see* Water Supply  
 Carbon Dioxide Recorder; description of, 832  
     electrically operated, 834  
 Carbonate Equilibria; and hydrogen-ion concentration, 679  
 Catskill; *see* Water Supply  
 Cement; essential characteristics of, 680  
     factors affecting hydration of, 680  
     new types of, 832  
     testing and specification of, 680  
 Cement, Fused; hardening of, rapid, 833  
     manufacture of, outlined, 832  
     remarkable resistance of, to sulfate and sea water, 833  
 Cement Gun; cleaning steel by means of 662  
     use of, in water works construction, 957  
     *see* Guniting  
 Chadron, Neb.; water works completed before application for permit, 667  
 Check Valves, Double; *see* Water Supply, Cross Connections  
 Chemicals; American manufacturers of, 832  
 Chester, England; *see* Water Supply  
 Chicago; *see* Water Supply  
 Chlorination; *see* Water, Chlorination; Nitrogen Trichloride  
 Chlorine, electrolytic generation of, local, 370  
     explosion danger absent from, 155  
     fire and, 155  
     first aid and, 155  
     fusible plugs for, set at 158°F., 155  
     leaks of; causes, detection, 155  
     shipment and storage of, 155  
     *see* Water, Chlorination  
 Cholera; germs of; alkalinity claimed to destroy, 821  
     storage claimed to destroy, 821  
     survive 4-5 days in sea or river, 831  
     survive 1 day in septic tank, 831  
 Chromium, salts of; basic compounds and their graphical representation, 834  
     precipitation (coagulation) with sodium carbonate; complexity of reactions; ionisation, hydrolysis, peptisation, 832  
 Cincinnati; *see* Water Supply; Ohio River  
 Cladotrix Dichotoma; *see* Iron Bacteria  
 Clarksburg, W. Va.; *see* Water Supply  
 Cleburne, Tex.; water meter experience at, 823  
 Cleveland, Ohio; ozone treatment adopted for swimming pool, 678  
     *see* Water Supply  
 Cloud-burst; periodicity; floods from, protection against, 950  
 Coal; heat value of, known by flue gas analysis, 677  
     pulverised; largest installation for, 672  
     *see* Combustion; Flue Gas  
 Cohesion; comparison of, with chemical affinity, 539  
 Colloid; effusion of, follows Smoluchowski formula, 677  
     substances of sparing solubility often are, 676  
     toxicity and, 676  
 Colloid; Adsorption; *see* Adsorption  
 Colloid; Charge on; origin of, 539  
     *see* Alumina  
 Colloid; Coagulation; electrolyte; effective coagulants may protect at low concentration, 676  
     effective protectants may promote coagulation at low concentration, 677  
     heat of, very small, 676  
     hydrogen-ion concentration an important factor; law of ionic synergism, 538  
     stability a function of degree of dispersion, 676  
     transition from coagulation to protection, a general phenomenon, 677  
     freezing and, 676, 831  
     heat and; mechanism of coagulation by boil, 677  
     non-electrolytes and; negative colloids and, 677  
     quantitative methods for, 677  
 Colloid; Dispersion, Degree of; dilution increases, 676  
     electrolytes cause to vary, 676  
     stability a function of, 676  
 Colloid; Protection; *see* Colloid; Coagulation  
     electrolyte; may protect at low concentration, 676

- hydrophilic colloids protect; but at low concentration may promote coagulation, 677  
 mechanism of, 677  
 Colloid; Stability; *see* Colloid; Coagulation  
*see* Colloid; Degree of Dispersion  
 Color; Hydrogen-Ion Concentration; decolorisation of cane-juice aided by increasing hydrogen-ion concentration, 547  
 tan liquor color a function of hydrogen-ion concentration, 547  
 Colorado; Public Health Law of, 366  
 Colorado River; proposed 780-ft. rock fill dam at Lee Ferry, Arizona, 950  
 Columbus, Ohio; *see* Water Supply  
 Combustion; coal, United States; combustion characters of, and types of stoker for, 820  
 principles of, 678  
*see* Flue Gas  
 Concrete; acid proofing of, 666  
 aqueduct, 8-foot, of reinforced, 154  
 corrosion of; *see* Concrete; sea water and  
   alkali salts and, 833  
   alkaline water and, 154  
   concentration effect, 833  
   permeability and, 833  
   sulfates especially active, 833  
 forms for, construction of, 673, 834  
 permeability of; and structure, 833  
 reinforcement; rusting of, 956  
 sea water and; 678, 680, 833  
   frost and ice damage, 678  
   protection, 680  
   tide level; concrete attack and, 680  
   tide level; reinforcement attack, 681  
   vibration of; 6 per cent strength increase by, 663  
   waterproofing of, 681, 833  
 Condenser; leakage determination, 672  
 Conduit; concrete, novel type; Tacoma; design, cost, 674  
 gunite, 3-inch, 674  
*see* Aqueduct  
 Copper; Kastel-Mayer test for; very sensitive, 676  
 may be applied quantitatively, 676  
*see* Water, Copper Sulfate Treatment  
 Corrosion; boiler, reduction of; by hydrogen-ion concentration control; by de-aeration, 670  
 British Institute of Metals Com. Report, 544-5  
 checking a case of rapid, 544  
 concrete; *see* Concrete; corrosion  
 domestic fittings and, 149  
 domestic fittings annual loss by, \$50,000,000, 822  
 factors of; carbonic acid, 544, 545, 681, 821  
   dust and deposited particles, 544, 545  
   hydrogen-ion concentration, 368  
*see* Iron Bacteria  
 oxygen the chief, 544, 545, 670, 820, 822  
 sun's heat, 835  
 temperature rapidly accelerates, 821  
 water, aggressive, 821  
*see* Corrosion; underground  
*see* Electrolysis  
*see* Water; Oxygen Dissolved  
 mechanism of; essentially a film problem, 544-5  
   hydrolysis, ionisation, etc., 821, 830  
 pipes of various metals and, 681, 835  
 plaster walls and, 681  
 study of, by indicator method, 830  
 underground; acid and alkaline soils, 154, 681  
   Bureau of Standards experiments, 544  
   *see* Corrosion; factors of  
*see* Iron; Protection: Water; Lead  
 Cost; concrete, cube yard, Indianapolis, 818  
 concrete reinforcement, placed, ton, Indianapolis, 818  
 conduit, concrete, Tacoma, 674  
 excavation, cube yard, Indianapolis, 818  
 filtration plant, 120 mgd, St. Louis, 666  
 main, water; at Hartford, Conn.; at Detroit, 674  
   at Cap de la Madeleine, 817  
   coating with reinforced concrete, 154  
 meters, water; instal; test; repair, 674, 675  
 reservoir, covered; London, England, 368, 663  
   Indianapolis, 818  
 reservoir, open, 400 billion gallon, estimate, 667, 674  
 standpipe repair; Bath, Me., 366  
 tunnel; Western Avenue, 675  
 Cost, Operating; Columbus, 1921, 671  
 Crenothrix Polyspora; *see* Iron Bacteria

- Cross Connections; *see* Water Supply
- Dam Construction; core material; condition, etc., 673  
 Gilboa, 675  
 rock-fill proposed for 780-ft. dam at Lee Ferry, Arizona, 950
- Deactivator; for reducing corrosion, 822
- Dean; electrical valve control, 154, 371
- DeLavaud; centrifugal cast iron pipe, 369
- Denitrification; sewage purification by, 547
- Depreciation; Carter and Ransom brief on; on behalf Consolidated Gas Co. of N. Y., 543
- Detroit, typhoid statistics, 675  
*see* Water Supply
- Discrimination, legal decisions on, 953
- Disease, Water-borne; diarrhoea, dysentery, typhoid, worm parasites, intestinal, 142
- Disinfection; studies in; bacterial mortality laws, 669
- District; organization, purposes, powers, limitations, 676
- Dorr-Peck Tank; chemical and biological reactions in, 671
- Dysentery; storage claimed to destroy germs of, 821  
 water-borne, 142
- East Chicago; *see* Water Supply
- Egyptian Expeditionary Force; *see* Water Supply
- Electrolysis; three-wire system mitigates, Winnipeg, 142  
*see* Corrosion
- Endo's Medium; mechanism of color production, 822
- Engine; horse-power of, computing, 834  
*see* Indicator Diagram
- Engine Efficiency; just over 24 per cent in four distinct modern types, 543
- Engine Life; 49 years at Cleveland, 543
- Evanston, Ind.; *see* Water Supply
- Evaporation; *see* Water, Evaporation
- Excavation; *see* Cost
- Film; stratified structure of; thickness of element of, 831
- Filter Plants, New; Alpena, Mich., 951
- Cambridge, Mass., 824  
 Detroit, 675  
 Sacramento, 830  
 St. Louis, 666
- Filtration; fundamental laws of, 545
- Filtration; remarkable accelerations, chiefly by adjustment of hydrogen-ion concentration, 832
- Fire Protection; charge for; city should share, 548  
 in New England cities, 149  
 proper basis for, 536
- Fish; oxygen concentration requisite for fish life, 544
- Flint, Mich.; water-gas waste treated with lime, 142
- Floods; periodicity; protection against, 950
- Florida; swimming pool regulations of, 831
- Flue Gas; analysis of; carbon dioxide determination, 678  
 analysis of; value of, 678  
 composition of, for maximum efficiency, 678  
 temperature of, for maximum efficiency, 678
- Fluorescein; detection of, 1:200,000,000, 665
- Flush valve; danger of; restricted utility; testing, 151
- Forest; Bridgeport undertakes reforestation, 366  
 need for, on watersheds  
 Pennsylvania encourages, 953  
 possible profit from, 953  
 redpine for; resists weevil, rust, slugs, 366  
 reforestation; Baltimore and, 958  
 run-off and, relation, 661
- Fort Smith, Ark.; *see* Pump; testing of
- Frankfort; *see* Water Supply
- Gallionella Ferruginea; *see* Iron Bacteria
- Gann; transition observed by, from coagulative to protective effect, a general phenomenon, 677
- Garbage Disposal; development of, 534  
*see* Iowa; State Board of Health Rules, etc.
- Gary, Ind.; *see* Water Supply
- Gatun; *see* Water, Evaporation; Water Supply
- Georgetown, Ky.; *see* Water Supply
- Gilboa; dam construction, 675
- Glass; alkalinity of containers of, 956

- Glycerophosphate; suitability as buffers, 957  
 Griscom-Russell; *see* Boiler Feed Water  
 Ground Water; conditions governing supply, 153  
   hydrogen-ion concentration of, 955  
   temperature changes of, and depth, 661  
 Gunite; conduit, 36", Tacoma, of 3" gunite, 674  
   standpipe, steel, reinforced with, 662  
   waterproofing leaky reservoir, 662  
   *see* Cement Gum  
 Hague, Holland; *see* Water Supply  
 Hardness; *see* Water, Hardness  
 Hartford, Conn.; *see* Cost  
 Harvard University; School of Public Health at, 951  
 Heating Systems; explosion danger; relief valves needed, 149  
   *see* Corrosion  
 Hermans, Chas.; pioneer of mechanical filtration, 540  
 Hetch Hetchy; *see* Water Supply; San Francisco  
 Holyoke, Mass.; lead pipe trouble at, 150  
 Humphrey Gas Pump; high efficiency of, 543  
 Hyatt, Alpheus; first aluminum sulfate coagulation patent, 1884, 540  
 Hydrants; A.W.W.A. specifications adopted by railroads, 828  
 Hydrogen-Ion Concentration; automatic control and record of, 670, 834  
   bacteriological media and, 669  
   borate equilibria and, 679  
   buffer index and, 669  
   carbonate equilibria and, 679  
   color and; *see* Color  
   explanation of, 370  
   filtration remarkably accelerated by adjustment of, 832  
   industrial application of, 670  
   *see* Water; Hydrogen-Ion Concentration  
 Hydrogen-Ion Concentration, Determination of; colorimetric; discussion of, 835  
   without standards, with m-nitrophenol; for water and culture media, 537, 545  
   continuous, with record, 670, 834  
   electrode for, new 834-5  
   electrometric; description of, notes on, 957  
   *see* Water, Hydrogen-Ion Concentration Determination  
 Hydrosol; *see* Colloid  
 Ice; lack of oxygen due to, causes tastes, 371  
 Illinois; Division of Engineering and Sanitation Rpt., 826  
 Illinois; Society of Engineers, Report, 145  
   State Department of Public Health, Report, 145  
   typhoid fever statistics of, 147  
   water supply; *see* Water Supply  
 Illinois State Water Survey; index to Bulletins 1-16, 534  
   specifications for water works laboratory, 154  
 Incrustation; from softened water; acid treatment for, 144  
   iron bacteria and, 680  
   *see* Water; After-precipitation  
 Indiana; *see* Water Supply  
 Indianapolis; new covered reservoir, 818, 829  
 Indicator; American manufacturers of, (analytical), 832  
 Indicator Diagram; admission line on, 672  
   back pressure line on, 672  
   compression line on, 672  
   compression, proper, how to find, 672  
   examples of various, 672  
   planimeter integration of, 834  
 Injector; practical information on, 672  
 Intake; *see* Water, Intake  
 Interstate; *see* Water Supply; Interstate; do. Railroad  
 Iowa; State Board of Health; Rules, etc., 533  
   N. B. For "Ohio" read "Iowa"; *see* correction p., 683  
   University of; research at, 828  
   water supply; *see* Water Supply  
 Iron; tubercular incrustation on, 680  
 Iron Bacteria; acidity favors; alkalinity checks, 680  
   causes of, and remedies against, 680  
   forms assumed by growths, four, 680  
   species causing trouble, five, 680  
 Iron, Cast; spongy disease of, 680  
 Iron, Corrosion; *see* Corrosion  
 Iron, Malleable; street vault covers of to withstand heavy trucks, 817  
   ultimate tensile strength, 817  
 Iron, Protection; absolute protection not attained, 830

- bituminous preparations for, tested, 830  
 paints; *see* Steel, Paints for; Zinc Chromate  
 Iron Sulfate; specifications for, 828  
 Irrigation; canals; cleaning of, 674
- Jacobstown, N. J.; typhoid epidemic, 147, 366
- Kentucky; State Board of Health; may stop supply of impure water, 666  
 may not dictate pure water source, 666
- Kutter's Formula; results from, surpassed by Manning's, 142  
 simplified form of, 539
- Laboratory; specifications for water works, 154
- Lawrence, Mass.; experimental station founded at, 540  
 typhoid statistics at, 675
- Lead; *see* Water: Lead
- Leeds, Dr. Albert R.; real inventor of mechanical filtration, 540
- Lee Ferry, Arizona; proposed 780-ft. rock-fill dam on Colorado River at, 950
- Legal Decisions; amortisation of legal expense, 953-4  
 Beaver Valley Water Co. case, 953-4  
 discrimination, 953-4  
 Mercersburg, Lehmaster, & Marks Electric Co. case, 953-4  
 Mountain City Water Co. case, 953-4  
 municipal competition disallowable, 953  
 municipal contracts, 953-4  
 municipalities and coal mines, 953  
 Ohio Valley Water Co. case, 953-4  
 "present value": how assess?, 953  
 purchase price of Water Works, 953  
 rates; once filed, must be paid, 953  
 rental questions, 953  
 valuation; tribunals having jurisdiction on, 953  
 water works revenue not divertable in Ohio, 951
- Leptothrix Ochracea; *see* Iron Bacteria
- Lexington, Ky.; *see* Water Supply
- Lime; dust nuisance from; alleviation of, 829  
 specifications for, hydrated and quicklime, 828  
 waterproofing of concrete and, 681  
*see* Water: Lime
- Lincoln, Neb.; ozone-treated swimming pool at, 678
- Locomotive; *see* Boiler Feed Water; Water Supply, Railroad
- London, England; *see* Water Supply
- Los Angeles; meter repair cost, 675  
 pipe, steel, 33", coated reinforced concrete; cost, 154
- Lozoya; *see* Water Supply, Madrid
- Lubricants; specifications for, Bureau of Mines, 834
- Madrid, Spain; typhoid mortality one-fifth of total, 830  
*see* Water Supply
- Magnesium Hydroxide; hydrogen-ion concentration and precipitation of, 957
- Manganese Bronze; specifications of, for valve stems, 370
- Manitoba; University of, research at, 828
- Manning's Formula; results from surpass Kutter's, 142
- Marquette, Mich.; wood tar waste causes tastes at, 142
- Manzanares; *see* Water Supply, Madrid
- Maps; importance of good, to water works, 823
- Maryland; State Department of Health, Engineering Bulletin No. 1, 533
- Massachusetts; *see* Water Supply
- Maumee River; oxygen exclusion by ice causes tastes in, 371
- McKeesport, Pa.; water softening at, 817
- Metal cutting; fifty feet under water; electric torch, 666
- Meter; *see* Water Meter
- Michigan, Lake; *see* Water, Michigan Lake
- Millsbaugh; centrifugal cast steel, 369
- Milwaukee; sludge filtration at, 832  
*see* Water Supply
- Minnesota; State Board of Health; laws, regulations, 534
- Mississippi; Health Bulletin, No. 16, 142  
 water supplies, rural, protection of, 142  
 water-borne disease in, 142
- Mississippi River; alkalinity, hardness, sulfate, in, 817  
 softening of water of, 817



- Missouri Pacific Railroad; water treatment; statistics, 829  
coal saving by, 829  
Montana; University of; research at, 828  
*see* Water Supply  
Montclair, N. J.; intestinal trouble epidemic at, 664  
Muskogee, Okla.; water softening at, 817
- Nashville, Tenn.; waterproofing reservoir at, 662, 825  
New England; rainfall and run-off records, 151, 152  
New Hampshire; *see* Water Supply  
New Jersey; State Department of Health; annual report, 534  
*see* Water Supply  
New York (State); *see* Rainfall; Run-off; Typhoid; Water Supply  
New Zealand; hot springs of Rotorua, 954  
Nitrogen Trichloride; chlorinating activity of, 832  
chloramine formation by, 832  
m-Nitrophenol; for hydrogen-ion concentration determination, 537, 545  
North Manchester; *see* Water Supply
- Ohio; filter plant control and operation in, 818  
laws of, against impure water, 825  
Ohio River; level of, at Cincinnati, varies 71 feet, 662  
Oklahoma City, Okla.; water survey at, effects saving, 824  
Ontario, Lake; *see* Water, Ontario Lake  
Oxygen; corrosion and; *see* Corrosion, water solubility of, 670
- Paint; structural steel, 538  
Paint, Coal Tar; steel protection by; unsatisfactory, 538  
testing of, 830  
Pan; production of; hydrosol coagulation process, 680  
Permutite; ignition of, effect on, 545  
slower in action than Borromite, 832  
water, combined, of; influence of, 545  
zero hardness by, 832  
Petroleum Products; specifications for, Bureau of Mines, 834  
Philadelphia; *see* Water Supply  
Piezometer; precautions needed in use of, 536
- Pine; red pine resists weevil, rust, slugs, 366  
Pipe; A.W.W.A. specifications for, adopted by railroads, 828  
corrosion of; lead, copper, zinc, alloy, 835  
horizontal, on rigid saddles; stresses in, 369  
materials for, compared; iron, cement, steel, wood, 367, 952  
Pipe, Cast Iron; centrifugal, DeLavaud, 369  
coating for, 152, 367  
weather and, 367  
corrosion of, 835  
*see* Corrosion; Iron, Cast  
Pipe, Cast Iron; leakage of; small, at high pressure at Delft, Holland, 820  
life of; good after 19 years, 368  
manufacture and inspection of, 151  
specification for, improved, 371  
*see* Water Main  
Pipe, Iron, Wrought; corrosion of, through sun's heat, 835  
Pipe, Lead; antiquity and durability, 955  
*see* Pipe; etc.  
Pipe, Steel; covering for, protective, 545  
spiral; friction loss in, 142  
Pipe, Wood Stave; experience with; repairs of, 367, 370, 952  
life; how shortened, 675  
redwood outlasts fir, 675  
pressure on, both internal and external, need careful adjustment, 370  
*see* Pipe; etc.  
Plumbing; corrosion and; water supply and, 149  
lead service pipes undesirable at Gatun, 151  
relief valves for heating systems, 149  
uniformity of regulations, a need, 150  
Population; fourteenth decennial census, 537  
Portland Cement; *see* Cement  
Price; diagrams and tables of monthly, of materials, 154  
*see* Cost.  
Procter-Wilson Theory; application of, to sludge filtration, 832  
Protection; *see* Colloid; Protection  
Public Health; influence on, of sanitary engineering, 534  
Pump; increasing efficiency of, example of, 543



- Humphrey gas pump, 543  
 sanitary hazard by breakdown of, 825  
 testing of, speed, capacity; Fort Smith, Ark., 824  
 vertical triple expansion pumping engine, 543
- Pump, Air-Lift; some advantages of, 537
- Pump, Centrifugal; adaptable to Rail Road service, 828
- Pump, Rotary; Exeter patent, 144
- Purdue; University of; research at, 828
- Rainfall; cloud-burst type; periodicity of, 950  
 measurement of, 143  
 snowfall a difficult problem, 152
- Rainfall; records of; New England, New York, &c., 151, 152, 368  
 run-off and, 661
- Rainage; British Meteorological Office pattern, 668  
 reliability of standard 8-inch, 152
- Rates, Utility; undepreciated base recognized, 818
- Recording Instruments; thermometers, pressure-gages, total-quantity-meters, carbon dioxide, etc., 832  
 hydrogen-ion concentration, 670, 834
- Reforestation; *see* Forest
- Relief Valves; need for, on heating systems, 149
- Repair Work; at Columbus, 1921, 671
- Reservoir; covered; Indianapolis; construction, cost, 818, 829  
 covered, London, Eng.; large, hexagonal, low cost, 368, 663  
 leaky; Nashville: repairing, 662, 825  
 list of largest in United States in 1920, 830  
 Littleton, Staines, Eng.; large meters for, 954  
 use of, as pleasure resort, 152, 542, 667
- Rhode Island; *see* Water Supply
- Rice; cultivation of, leads to river pollution, 148
- Riessler; *see* Water, Iron Removal
- Rio de Janeiro; remarkable ancient aqueduct at, 661
- Rotorua, N. Z.; hot springs at, therapeutic, 954
- Run-off; determination of, 368  
*see* Stream Gaging  
 forest cover and, 661  
 rainfall and, 661  
 records of, New England and New York, 151
- Sacramento; *see* Water Supply  
 River; pollution of, 148
- Saginaw; *see* Water Works Accounting
- St. Louis; *see* Water Supply
- St. Paul; *see* Water Supply
- Salem, Ohio; typhoid epidemic at, 367  
*see* Water Supply
- San Francisco; *see* Water Supply
- Sand; *see* Water Filtration
- Sand; adsorption by, of ammonia and organic matter, 665  
 incrustation; *see* Incrustation  
 size, effective; filtration results and, Ohio, 535
- Sanitary Engineering; Iowa State Board of Health, Rules, 533  
 N. B. For "Ohio" read "Iowa" Public Health and, 534
- Scoring; water supplies, 533  
 water and sewage treatment works, 675
- Screens, Intake; huge, at Cincinnati, 662
- Sea Water; action of, on concrete, 678
- Searles Lake; hydrogen-ion concentration of, 679
- Service Charge; discrimination avoided by, 954  
 elements of; propriety of, 954
- Sewage Treatment; *see* Activated Sludge  
 development of, 534  
 denitrification in, 547  
 dilution and, 544  
 general principles, 544  
 Iowa State Rules, 533  
 N. B. For "Ohio" read "Iowa" oil and grease recovery, 955
- Sewerage Cost; plan for meeting, 533
- Silk; hard water disadvantageous for, 956
- Sioux City, Iowa; *see* Water Supply
- Smoluchowski; effusion law of, confirmed by experiment, 677
- Snow; difficulty of measuring correctly of, 152
- Soda Ash; *see* Boiler Feed Water  
 specifications for, 828
- Soil; absorption by, follows laws of colloids, 680  
 acid; some constituents of, 681  
 corrosion; acid, alkaline, 681  
 pan; *see* Pan
- Spirophyllum Ferrugineum; *see* Iron Bacteria

- Stains; American Manufacturers of, 832
- Standpipe; repairs to, 154, 366
- Steam Plant; *see* Boiler; Coal; Combustion; Condenser; Corrosion; Engine; Flue Gas; Indicator Diagram; Injector; Stoker Equipment; Turbine
- Steel, Cast; centrifugal; Millspaugh process; testing, 369
- Steel, Paints for (*see also* Iron, Protection), 538
- Steel, Stainless; applications of, 538
- Stoker Equipment; *see* Combustion
- Storage Battery; care of, 672
- Stream Gaging; instruments, methods, difficulties, 368  
*see* Run-off
- Street Vault Covers; of malleable iron, for greater strength, 817
- Sulfurous Acid; determination of, improved Haas, 678
- Surface; chemical reaction at, 545  
*see* Corrosion; Film
- Swimming Pool; bacteriological standards for, 822  
California regulations, 831  
chlorine treatment of, 831  
control of, essentials for, 822  
Florida regulations, 831  
ozone treatment of, 678  
ultra-violet ray treatment of, 822
- Synergism; ionic, law of, 538
- Synura; in Catskill supply; elimination of taste from, 662
- Taste; *see* Water, Taste
- Terre Haute Water Works Co.; filing methods, 823  
instructions to householders, 536  
malleable street vault covers, 817
- Torch, Electric; cuts 36-inch cast iron main at 50 feet under water, 666
- Tunnel; Western Avenue Extension, 675
- Turbidity; *see* Water, Turbidity
- Turbine; steam; heat loss at starting up, 834  
testing of, at Fort Smith, Ark., 824
- Typhoid; alkalinity claimed to destroy germs of, 821  
Aberdeen, Scotland, free from, 153  
Bridgeport death rate from, very low, 366  
carriers and, 147, 366  
Columbus death rate from, reduced 90 per cent, 144  
compensable injury, under Indiana decision, 825  
damage suits for, 951  
death rate from, sweepingly reduced, 534, 541, 819, 826  
Detroit; bathing causes many cases, 675  
epidemic of; Bloomington, 144  
Jacobstown, N. J., 147, 366  
high case; exposure ratio, 147  
Salem, Ohio, 367  
Walnutport, Pa.; damage suits, 951
- Illinois and, 147
- Lawrence, Mass., decline in death rate from, 675
- Madrid, Spain; one-fifth of all deaths from, 830
- Typhoid; Sacramento and, 148  
Toronto death rate from, greatly reduced, 683  
West Virginia and, 142  
*see* Bacterium Typhosum
- Underdrain; *see* Water Filtration, Rapid Sand
- Union Pacific Rail Road; *see* Boiler Compound
- United States; census, fourteenth decennial, 537  
Military Academy; swimming pool ozone treated, 678
- Utilities, Accounting; reasonable return, defined, 663  
uniformity in, prescribed by Missouri, 663  
valuation and rate fixing, 663
- Valves; A. W. W. A. specifications adopted by Railroads, 828  
electrical operation of, 154, 371  
indicators of opening of; colored liquid, 830  
locating quickly of; importance of maps for, 823  
manganese bronze for stems of, 370
- Valve, Flush; *see* Flush Valve
- Valve; Loss of Head; turbulence error in determining, and method to avoid, 536
- Valve, Relief; need for, on heating systems, 149
- Venturi; *see* Water Meter
- Wabash Railway; *see* Boiler Feed Water
- Wagon Wheel Gap, Colorado; forest-stream-flow experiments at, 661
- Walnutport, Pa.; damage suits for typhoid, 951
- Waste, Coke-Oven; tastes and odors from, 541

- Waste, Gas-Works; tastes and odors from, 541  
*see* Waste, Water-Gas
- Waste, Industrial; Iowa State regulations concerning, 533  
 N. B. For "Ohio," read "Iowa"  
 petroleum and oil-well, 822  
 rice cultivation, 148  
 salt and potash works, 835  
 water supply and, 822  
 zinc smelters', 822
- Waste, Water-Gas; lime treatment of, at Flint, Mich., 142
- Waste, Wood-tar; taste from, at Marquette, Mich., 142
- Water, Acid; mines and, 670  
 acidity determination in, free and hydrolytic, 670  
 iron bacteria favored by, 680  
 therapeutic hot springs at Rotorua, N. Z., 954
- Water: After-Precipitation; hydrogen-ion concentration and, 368  
 in softened water, 144
- Water, Aggressive; cause, control, manifestations of, 540  
 corrosion by, and its prevention, 821
- Water, Alkalinity; *see* Alkalinity  
 changes in, by coagulation, 667-8
- Water: Alumina; *see* Water, Coagulation
- Water: Aluminum Sulfate; *see* Water, Coagulation
- Water Analysis: bromine, tentative method for, 678  
 nitrate; phenoldisulphonic acid, report on, 678  
*see* Copper; Laboratory; Water, Acid  
*see* Water, Bromine; Water, Carbonic Acid Determination; Water, Hydrogen-Ion Concentration Determination; Water, Iron Determination; Water, Manganese Determination; Water, Phosphate Determination; Water, Suspended Matter
- Water: Arsenic; arsenic found in spring water, 147
- Water, Bacteriological Examination; lactose fermenters and total count on agar the essentials, 664  
 sodium taurocholate advocated, 682  
 standard methods for B. Coli criticised, 682  
*see* Bact. Coli
- Water, Boiler Feed; *see* Boiler Feed Water
- Water; Bromine; determination of, volumetric, 956  
*see* Water Analysis
- Water, Carbonic Acid Determination; double titration using phenolphthalein and methyl-orange, suitable, 957
- Water: Carbonic Acid Removal; lime for, at Virginia Beach, Va., 829  
*see* Boiler Feed Water; Water Softening  
*see* Water, Aggressive
- Water, Chlorination; chlorine absorption and, 533  
 control of, 533  
 copper sulphate treatment in combination with, 662  
 corrosion and, 681  
 efficiency and value of, 535, 679  
 electrolytic chlorine for, local production, 370  
 filtration not replaceable by, 370
- Water, Chlorination; resistant to; micro-organisms, 665  
 spores, 370  
 stormy fermenters, 665  
 sanitary hazard to; chlorine stock exhaustion, 825  
 seasonal variation in chlorine requirement, 682  
 small supplies and, 681  
 symposium on, 370  
 tastes; aggravation of, 541, 683  
 removal of, by excess chlorine, 662  
*see* Water, Taste
- Thames, England, water, and, 664
- Wallace & Tiernan apparatus for swimming pool, 831
- Water, Chlorine Absorption; chlorination and, 533
- Water, Coagulation; aluminum sulfate; invention and early history of, 540  
 reaction mechanism, 667, 957  
 alkalinity and, 667  
 data, analytical, 667  
 hydrogen-ion concentration and, 368, 667, 957  
 for complex nature of reactions between salts of trivalent metals and carbonates, *see* Chromium,  
 residual compounds from, 533, 667, 682  
 solutions of; testing, etc., 370  
 feeding; ejectors replace pumps for, 829  
 lime process, 821, 829  
*see* Water Filtration, Rapid Sand

- Water, Color; colloidal nature of, 541  
 filtration and; mechanical more effective than slow sand, 541  
 removal of; at Virginia Beach, Va., 829  
 standards for, desirable, in filtered water, 541  
 storage and; reduction, 541  
 study of; need for further, 541
- Water, Conductivity; boiler control by, 820
- Water, Consumption (per capita)  
 daily of; Bradford, England, 46 gals., 682  
 Britain; average of principal cities, 35 gals., 682  
 Bryan, Ohio; 98 per cent metered; 100 gals., 667  
 Buffalo, N. Y.; declines from 339 to 227, 951  
 Canadian, 366  
 Copenhagen, Denmark, 117 litres, 678  
 East Chicago; reduced from 200 to 70 gals., 824  
 Rhode Island; range, regular, 33 to 210 gals., 148  
     average, 82 gals.; one town uses, 360, 148  
 St. Louis; ratio average daily: maximum month: maximum week: maximum day is 100: 225:235:250, 825
- Water, Copper Sulfate Treatment of; Catskill supply, 662
- Water: Corrosion; *see* Corrosion
- Water, Deferrization; *see* Water, Iron, Removal
- Water, Elbe; excessive hardness and salinity of, due to chemical wastes, 664
- Water, Evaporation; Gatun Lake records 62 inches, year, 143  
 measuring of, method for, 143  
 New England records of, 151  
 vegetation and, 151  
 water table, depth of, and, 153
- Water Filtration; control and operation in Ohio, 818  
 control devices, improved, at Sacramento, 830  
 historical notes on, 540  
*see* Water Purification, Standards
- Water Filtration; Bacterial Removal; degree and nature of; scoring and index numbers, 533
- Water Filtration, Mechanical; *see* Water Filtration, Rapid Sand
- Water Filtration, Rapid Sand; coagulant replaced by chlorine in, 682  
 color and; high efficiency of, 542  
 efficiency of, 542, 679, 681  
     seasonal variation of, 682  
 invention and early history of, 540  
 underdrains for; perforated pipe adopted at Alpena, Mich., 951  
 sand size, great importance of, 535  
 sand surface; shrinkage of, 533  
 washing; rate indicator for, 830  
 washing; turbidity criterion for, 371
- Water Filtration, Slow Sand; cleaning methods, new, 153
- Water Filtration, Slow Sand; efficiency of; seasonal variation of, 682  
     mechanical prefiltration increases 153, 955  
     finest sand as intermediate layer; good results from, 955  
     Hague, Holland, latest type of, 547  
     raking of sand surface, 682  
     resanding methods, 153  
     Toronto; good results at, 682  
     tropical experience with, 153
- Water, Flow; friction loss in spiral pipe, 142
- Water, Gases Dissolved; deactivators to remove, 822  
*see* Water, Oxygen Dissolved
- Water, Ground; *see* Ground Water
- Water, Hardness; health and (*see* Calculus), 673  
 Massachusetts, New Jersey, New York, figures of, 674  
 silk and; disadvantages of, 956
- Water, Hydrogen-Ion Concentration of; observations on, 146, 533  
 after-precipitation and, 368  
 bacterial life and, 669, 821  
 borate waters and, 679  
 corrosion and, 368  
 purification and, 368  
 range of, in England, 955  
 value of test still unproven, 370  
*see* Hydrogen-Ion Concentration
- Water, Hydrogen-Ion Concentration Determination; colorimetric, without buffer, 537  
*see* Hydrogen-Ion Concentration Determination
- Water, Intake; Cincinnati, (*see* Screens, Intake), 662  
 Chicago; crib repairs at, 819
- Water, Iron Determination; colorimetric, rapid, 546

- Water, Iron Removal; closed filters, in, 952  
 closed system, with lime, 547  
 coke aerating towers, or Riesslers, for, 951, 952  
 Virginia Beach, Va., effects, 829
- Water: Lead; chlorine, residual, without action, 151  
 determination of small quantities of lead, 823  
 distilled water highly corrosive, 151  
 extensive experiments at Panama, 150-1  
 factors oxygen, carbonic acid, alkalinity studied, 150-1  
 Holyoke, Mass. experiences, 150  
 lead flashing contaminates water, 837  
 pipe corrosion, and its mitigation, 835  
 significance probably underrated, 151
- Water, Leakage; Bielefeld, Germany, 836  
 Delft, Holland; low leakage with high pressure, 820  
 East Chicago, 12 per cent, 824  
 fixtures and; and how to repair, 824  
 Gary, Ind.; on metered services, 17 per cent, 824  
 Lexington, Ky.; 16.5 per cent, 824  
 North Manchester; 6.77 per cent, 824  
 Oklahoma City, Okla.; saving by survey, 824  
*see* Water, Waste of
- Water: Lime; *see* Water, Coagulation; Water, Purification; Waste, Water-Gas
- Water, Loss; *see* Water, Leakage; Water Theft; Water, Waste of
- Water Main; replacing 12-inch by 24-inch, 368  
*see* Cost; Pipe
- Water, Manganese; taste unaffected by 5 p.p.m. of, 546
- Water, Manganese Determination; colorimetric, rapid, 546
- Water, Manganese Removal; 546
- Water, Meter; Bielefeld, Germany, experience with, 836  
 Bradford, England, does not favor, 682  
 Cleburne, Tex., experience with, 823  
 East Chicago; favorable experience with, 824  
 Frankfort Water Co. investment in, 824  
 Gary, Ind., experience with, 824  
 Lexington, Ky.; experience with, 824  
 North Holland (province) does not favor, 820  
 North Manchester; experience with, 824  
 registering of; defective at low rates, 836  
 Sioux City; 100 per cent metered, 819  
 Venturi; exceptionally large, 954  
*see* Cost
- Water, Michigan Lake; data of plants using, 825
- Water, Microscopic Organisms; copper sulfate removes, 662
- Water, Nitrate Determination; chlorine removal necessary in phenol-disulfonic acid method, 678
- Water, Odor; removal of, at Virginia Beach, Va., 829  
*see* Water, Taste
- Water, Ontario Lake; hydrogen-ion concentration of, 146  
 pollution of, progressive, at Toronto, 682
- Water, Oxygen Dissolved; concentration; limit for fish life, 544  
 limit to prevent nuisance, 544
- Water, Oxygen Dissolved; determination of, field kit, 820  
 removal of; deactivators, 822  
 solubility curves of, 822  
 solution, rate of, determination of, 538  
 solution promoted by agitation, 538  
*see* Corrosion; Water, Gases Dissolved
- Water: Ozone; swimming pool treated successfully by, 678
- Water Percolation; experiments on, 153
- Water: Phosphate Determination; Deniges, improved, 679
- Water Pipe; *see* Pipe
- Water, Pollution; *see* Water Supply, Pollution
- Water Purification; control of needful, 534  
 development of, 534  
 history of, 539  
 hydrogen-ion concentration and, 368, 821  
 Iowa practice in, 368  
 Iowa State Board of Health Rules etc., 533  
 N. B. For "Ohio" read "Iowa" lime coagulation successfully applied, 821, 829



- mechanical filtration plus chlorination; efficiency of, 152, 679
  - with coagulant omitted, 152
- methods of, modern, 546
- reactions involved; study of, 957
- Texas; instructions to operators, 143
- tropics; chlorination needful, 154
- United States Army; mobile outfit for, 152
- see* Water, Chlorination; Water, coagulation; Water, Color; Boiler Feed Water; Water Softening; Water, Filtration; Water, Lime; Water, Ozone; Water, Sterilisation; Water, Self-purification; Water, Storage; Water, Ultra-violet Radiation
- Water Purification, Standards for; bacteriological, 664
  - Iowa State Board of Health, 533
  - London, England, standard, 664
  - Ohio State, 535
  - "properly treated water" defined, 664
  - "sterile water" defined, 664
- Water, Quality; *see* Water Purification, Standards for; Water Supply, Quality
- Water Rates; collection of, through P.O., Holland, 820
  - management the chief factor, 823
  - zoning adopted, 547, 548
- see* Legal Decisions; Rates, Utility; Service Charge; Water Works Accounting; Water Works Valuation; Water Supply Financing
- Water, Sea; *see* Sea Water
- Water, Self-Purification; L. Ontario, example of, 544
  - see* Water, Storage
- Water, Softening, essentials for successful, 817-8
  - experience with, successful, 817-8
  - incrustation following, 144
  - methods for; and discussion of, 818
  - Minneapolis considering, 817
  - savings by; soap, tea, etc., 681
- see* Boiler Feed Water; Boiler Scale; Borromite; Permutit
- Water, Standards; *see* Water Purification, Standards; Water Supply, Quality
- Water, Sterile; definition of, for technical purposes, 664
- Water, Sterilisation; *see* Water, Chlorination; Water: Lime; Water: Ozone; Water, Ultra-violet Radiation
- Water Storage; bactericidal effect in tropics, 154, 821
  - color reduction by, 541
  - protection by, inadequate, 826
  - reservoir, open; sanitary effect, 533
- Water Supply; resume of status of, 1921, 958
  - Aberdeen, Scotland; high purity of, 153
    - slow sand, improved; typhoid absent, 152-3
  - Albany, N. Y.; history of; rapid sand supplants slow, 951
  - Austria, 547
  - Baltimore; history of, 958
    - Montebello filters described, 958
    - protection of; reforestation, 958
    - storage enlargement; Loch Raven dam raised, 958
    - waste; successful coping with, 958
  - Belgium; review, 673
  - Bielefeld; figures of water loss, 836
  - Birmingham, Ala.; description of system, 818-9
  - Boston, Mass.; proposed new reservoir, 667, 674
  - Bradford, Eng.; advantage of soft water, 681
  - Bridgeport; description; metering; re-forestation; typhoid; waste, 366-7
  - Britain; severe shortage, 663
  - Bryan, Ohio; revamping artesian, 667
  - Buffalo; consumption; pumpage, 951
    - electrically operated valves, 154, 371
  - Cambridge, Mass.; description of, 824
  - Cap de la Madeleine; remodelling; costs, 817
  - Catskill; copper sulfate treatment, 662
    - siphon pipes for, 537
  - Chester, Eng.; description; history, 830
    - finest sand in intermediate layer, 955
    - prefilters, rapid sand, increase efficiency, 955
  - Chicago; crib repairs, 819



- Cincinnati; huge intake screens, 662  
revenue diversion disallowed, 951
- Clarksburg, W. Va.; booklet describing, 824
- Cleveland; operating and analytical data, 829  
improvements to plant, 829  
pumping engines; fine record of, 543
- Colorado; regulations in force, 366
- Columbus, Ohio; operating and financial data, 144, 671
- Copenhagen, Denmark; annual report, 1910-1, 678
- Cost; plan for meeting, 533
- Cross Connections; epidemic traced to, 144  
Hartford prohibits, 142  
Iowa regulations, 533
- N. B. For "Ohio" read "Iowa"
- Minnesota prohibits, 534
- New Hampshire regulations, 143
- Decatur; project; schemes to finance, 145, 819
- Delft, Holland; recent improvements, 820
- Detroit; mains, meters, cost, 674, 829  
new filter plant, 675
- East Chicago; metering; coagulant cost, 824, 825
- Egyptian Expeditionary Force; purification, 679
- Evanston, Ind.; coagulant cost, 825
- Extension; financing of, 149, 819  
investigating need of, 819
- Financing; Decatur; schemes proposed, 145, 819  
extensions, 149, 819  
Sioux City plan, 819  
see Water Works Accounting; Water Works Valuation
- Frankfort; metering a feature, 824
- Gary, Ind.; 50 per cent metered; loss, 17 per cent, 824
- Gatun; analytical data; treatment; action on lead, 150
- Georgetown, Ky.; softening, 817
- Germany; price is 6-10 times pre-war rate, 835
- Hague, Holland; latest type filter at, 546
- Hamburg, Germany; excessive hardness of Elbe water; 20 per cent ground water used, 664
- Holland; system of North Holland Province, 673
- Illinois; many places without public supply, 145  
see Illinois; etc.
- Indiana; meters and water loss, 824  
sanitary hazards, 825  
typhoid held compensable, 825
- Interstate; U.S.P.H. certifications, 666  
see Water Supply, Railroad
- Iowa; general review of practice in State, 368
- Java; good results by lime; by storage, 821
- Jerusalem; description; additions, 673
- Lexington, Ky.; loss, 16.5 per cent, 824
- London, Eng.; waste reduction; standards, 144, 664
- Madrid, Spain; sources of; typhoid high, 830
- Massachusetts; hardness, average, 674  
reasonably satisfactory, 370
- Metropolitan; planning for future needs, 826
- Milwaukee; phenol taste at extreme dilution, 818  
recommendations for, 142
- Minneapolis; Mississippi recommended, 145  
softening proposed, 817
- Montana; State Board of Health Report, 143
- New Hampshire; State Board of Health Report, 143
- New Jersey; excess diversion taxes, 1921, 829  
hardness, average, 674  
metropolitan district requirements, 826
- New York State; hardness, average, 674
- North Holland; provincial system; collection, 820
- North Manchester; loss, 6.77 per cent, 824
- Ohio; filter operation and control, 818  
laws controlling purity, 825  
water works revenue diversion disallowed, 951
- Philadelphia; central repair shop, 829
- Plans for; submission of; present practice, 818
- Pollution of; Colon group, index of, 370, 836  
typical instances of surface, 828  
see Water, Ontario Lake; Water

- Supply, Sacramento; Water Supply, Salem, O. Waste, etc.
- Protection of; defences; vigilance needed, 366, 370
- Baltimore practice in, 958
- modern methods of, 952
- Publicity; good publicity desirable, 824
- Quality; bacteriological standards, 664
- hardness; *see* Water, Hardness
- Ohio standards, 535
- salt concentration limits, 835
- scoring and index numbers, 533
- statistical method in, 533
- sterile water defined, 664
- suitable supply defined, 664
- see* Water Purification Standards
- Railroad; aggregate quantity and cost, year, 825
- agitation, excessive, harmful, 827
- careful check of quality needed, 827
- centrifugal pumps for, 828
- poor quality leads to expense, 825
- regulations, recent (drinking), 828
- research work at various centers, 828
- results; proposed form report, 828
- treatment; economy of internal, 826
- wide field for economical, 826
- see* Boiler Feed Water; Boiler Foaming; Boiler Compound; Water Supply, Interstate
- Rhode Island; State Board of Health Report, 147
- Rural; safeguarding of, 142
- Sacramento; history; chlorination effect, 148
- improved filter operation control, 830
- St. Louis; proposed new supply, 666
- water consumption data, 825
- St. Paul; Mississippi proposed for Twin Cities, 145
- Salem; description of; pollution, 367
- San Francisco; Hetch Hetchy project, 542
- Sioux City; financing of, 819
- Water Supply; small town; economics of, 830
- South Africa; unsatisfactory conditions, 144
- State control; report favoring, 369
- present practice replans, 818
- Terre Haute; *see* Terre Haute Water Works Co.
- Toronto; ten years' observations, 682, 837
- see* Water Chlorination; Water, Ontario Lake; Water Filtration, Rapid Sand; Water Filtration, Slow Sand
- Vienna, Austria, 547
- Virginia Beach, Va.; color and odor successfully treated; methods adopted, 829
- Wauseon, Ohio; supplementing failing ground supply by developing surface supply, 817
- Whiting, Ind., 825
- Water, Suspended Matter; detection of, sensitive, 675
- Water, Taste; chlorine and tar compounds 142, 541, 547, 683, 818
- manganese has small effect, 546
- oxygen exclusion by ice, 371
- Water, Theft; methods employed, 824
- Water, Therapeutic; sulphuric acid hot springs at Rotorna, N. Z., 954
- Water, Turbidity; detection in filtered water, 371, 675
- Water, Ultra-violet Radiation; bactericidal action, 146
- Water, Waste; control of; at Baltimore, 958
- at London, Eng., 144
- at Bridgeport, 367
- investigation of, should precede extension, 819
- prevention of, instructions for, 536
- see* Water, Leakage; Water, Loss
- Water Works Accounting; amortisation, depreciation, 823
- extensions; financing problems of, 148-9
- filing methods for water works, 823
- records kept by Saginaw, Mich., 824
- see* Depreciation; Fire Protection; Legal Decisions; Utilities, Accounting; Water Supply Financing; Water Theft
- Water Works Engineering; unusual problems, 154
- Water Works Instruments; indicating and recording, 664
- Water Works Valuation; revenue principle faulty, 821

- Water-gas Waste; lime treatment at Flint, Mich., 142  
Waterproofing; masonry reservoir, 662  
Watershed; *see* Forest; Water Supply, Protection of  
Wauseon, Ohio; *see* Water Supply  
Wells; *see* Ground Water  
Wells, Disinfection; instructions for, 681  
Wells, Drilled; increasing flow by blasting, 153, 536  
Wells, Pollution; typical instances of, 828  
Wells, Protection; Iowa State rules etc., 533  
N. B. For "Ohio" read "Iowa"  
West Grove, Pa.; death of citizen wrongly attributed to chlorination, 147  
West Virginia; State Board of Health Report, etc., 142  
Western Avenue Tunnel; extension, 675  
Wheatstone Bridge; principle; application to water, 820  
Whiting; *see* Water Supply  
Whittier, Cal.; cast iron pipe; improved specification, 371  
Winnipeg; aqueduct, concrete, large; corrosion, 154  
electrolysis experiences, 142  
Wood Stave Pipe; *see* Pipe  
Zinc Chromate; value as protective pigment, 538  
Zoning; *see* Water Rates